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LINE TAP VALVE AND METHOD FOR TAPPING INTO A PIPELINE

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FIG. 2

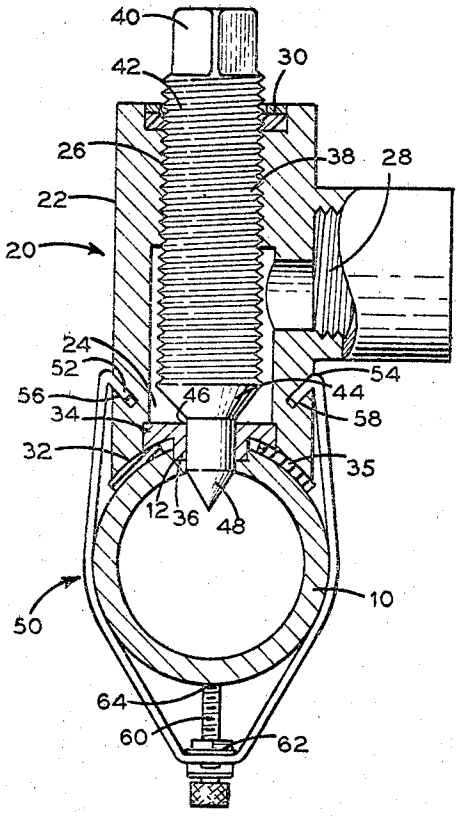


FIG. 1

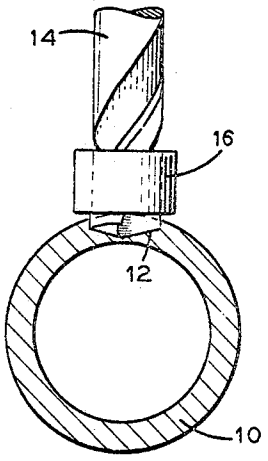
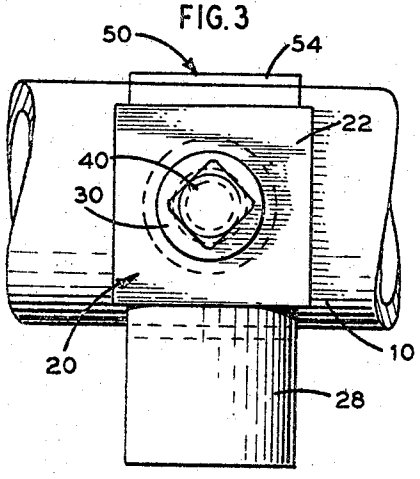


FIG. 3



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LINE TAP VALVE AND METHOD FOR TAPPING INTO A PIPELINE

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U.S. Cl. 137—318 9 Claims

ABSTRACT OF THE DISCLOSURE

The wall of a pipeline has drilled therein a pilot hole which does not completely pass through the wall. A line tap valve which includes a valve body carrying a valve stem through a valve chamber is fitted onto the pipeline by means of a strap. The bottom end of the valve chamber is closed off by a washer with a centerbored boss. The boss fits into the pilot hole. An end of the valve stem having a piercing element passes through the centerbore of the boss and is driven through the portion of the pipeline opposite the pilot hole. Thereafter the propelling and retraction of the valve stem provides the valving action between the valve chamber and the pipeline.

This invention pertains to line tap valves, for use in tapping a pipeline, generally to remove the fluid from the line to which it may be connected, or to inject a fluid into the line and its associated system.

In our U.S. Patent No. 3,252,474, issued May 24, 1966 we disclosed an improved line tap valve. While that valve admirably performs its desired function with certain types of pipelines (particularly refrigerant lines using copper tubing) it created a demand for even more versatile line tap valves (particularly those that can be used with steel pipe and the like).

Lately, there has been a demand for tapping into pipeline so that pre-existing pipelines can feed new fluid utilization devices. If it were possible to shut off the flow of fluid in the pre-existing pipeline the tapping would present no problems. However, in many pipeline systems it is either inconvenient or prohibitively expensive to shut down the pipeline. For example, in an illuminating gas distribution network for a residential area the main feed runs underground along a street and pipes tap off from the main feed and run underground into the homes. Generally there is a control valve in the street near the tap-off and another within the home. If for some reason, one desires to tap off from the portion of the pipe between the valves, it is necessary to dig a hole at the desired tap off point and also at the location of the street control valve. While the first hole is required for access to the line, the second hole is a nuisance and expense. If it were possible to tap into the line without shutting off the street control valve it would not be necessary to dig the second hole.

It is accordingly a prime object of the invention to provide an improved line tap valve which can be inserted in a pipeline while the pipeline carries fluid without the fluid escaping.

It is another object of the invention to provide such a line tap valve which can be used with steel pipe.

It is a further object of the invention to provide an improved method for tapping into fluid carrying pipelines.

Other objects, the features and advantages of the invention will be apparent from the following detailed description of the invention when read with the accompany drawings which show by way of example and not limitation, the now preferred embodiment of the invention. In the drawings:

FIGURE 1 shows a sectional view of a pipeline being prepared for tapping in accordance with the invention;

FIGURE 2 shows a sectional view of the line tap valve of the invention connected to the pipeline of FIGURE 1; and

FIGURE 3 shows a top view of the line tap valve and pipeline of FIGURE 2.

Referring to FIGURE 1, there is shown a pipeline **10** being prepared to receive a line tap valve. There is drilled into pipeline **10** a pilot hole **12** by drill **14**. Drill **14** is provided with a stop collar **16** which controls the depth of the pilot hole **12** in the wall of the pipeline **10**. The hole is drilled deep enough to remove most of the wall material without actually piercing the pipeline.

Then, the line tap valve **20** of FIGURE 2 is fitted to pipeline. Before describing this fitting procedure line tap valve **20** will be described. Valve **20** comprises a valve body **22** having a valve chamber **24**, a tightly pitched valve-stem-supporting threaded passageway **26** and a fluid outlet passageway **28** communicating with valve chamber **24**. Packing members **30** at the end of passageway **26** provide a fluid seal. The bottom of valve body **22**, as viewed in FIGURE 2, is provided with a pipe engaging face **32**. Face **32** is contoured to mate with the outerwall of pipeline **10**. Fixed to face **32** is a gasket **35** of resilient material to compensate for any mismating of the face **32** and the outerwall of pipeline **10**. Sealing off the bottom of valve chamber **24** is a washer **34** with a boss **36**. Boss **36** extends beyond face **32** and is shaped to fit in pilot hole **12**. Washer **34** is provided with a centerbore which passes through boss **36**.

The valve stem **38** which has the dual function of a valve stem and a pipe piercing tool comprises: a wrench-receiving head **40**; a threaded shaft **42** which meshes with valve-stem-supporting passageway **26**; a valving shoulder **44** having the shape of the frustum of a cone which cooperates with the valve seat defined by the inner peripheral edge **46** of the washer **34**; and a pointed piercing element **48**. When washer **34** is made of a metal such as copper or its alloys which is softer than valve stem **38** which is preferably hardened steel, the conical geometry of valve shoulder **44** provides excellent fluid sealing properties.

The valve body **22** is mounted on pipeline **10** through the agency of strap **50**. Strap **50** is preferably made of high-tensile-strength spring steel. Strap **50** is primarily bent in the shape of a U. The ends **52** and **54** are bent back through an angle of greater than ninety degrees to become hooklike elements which fit in slots **56** and **58** in opposite sidewalls of valve body **22**. The slots **56** and **58** extend obliquely toward the face **32** of valve body **22**. The central portion of strap **50** is provided with a hole through which passes a screw **60**. Screw **60** passes through threaded nut **62** which is carried by strap **50**.

When line tap valve **20** is to be mounted on pipeline **10** valve stem **38** is retracted so that piercing element **48** does not extend beyond the bottom of boss **36**. Strap **50** is not connected to valve body **22** and screw **60** is retracted. After the pilot hole **12** has been drilled a mechanic places face **32** of valve body **22** against pipeline **10** and so aligns it that boss **36** fits into pilot hole **12**. Then strap **50** is hooked onto valve body **22**. In particular, end **52** is fitted into slot **56** and end **54** is fitted into slot **58**. Screw **60** is then propelled toward pipeline **10** until the end **64** of screw **60** is driven sufficiently hard against pipeline **10** so that gasket **35** seals the interface between the outerwall of pipeline **10** and the face **32** of valve body **22**. A wrench (not shown) is applied to head **40** and valve stem **38** is propelled downward. As piercing element **48** is driven through the wall of pipeline **10** valve shoulder **44** moves toward seat **46**. The geometry is so chosen that when element **48** completely pierces the pipeline wall the valve is closed.

When the valve is to be opened valve stem **38** is retracted until element **48** is in valve body **24**. At that time, there is an unobstructed passage between pipeline **10** and passageway **28**, via the centerbore of washer **36** and valve chamber **24**.

Thus there has been shown an improved line tap valve and a method for tapping a line while the line carries fluid without any leakage of fluid. In a simple operation, the line is tapped and a valve fitted into the line.

What is claimed is:

1. A line tap valve for use with a pipeline that has a partially drilled pilot hole, such valve comprising:

a valve body having a pipeline engaging face contoured to rest matingly against a portion of the pipeline,

a valve chamber in said body,

a washer member fitted in said valve body in the region of said pipeline-engaging face, said washer member including a depending boss portion extending outward from said pipeline-engaging face and contoured to fit in said partially drilled pilot hole to locate said valve body on said pipeline, said washer member being provided with an opening passing therethrough in the region of said boss portion and communicating with said valve chamber,

a valve stem member movably supported by said valve body and passing through said valve chamber and the opening in said washer member, the end of said valve stem passing through said washer member including a pipeline piercing element, and a valve shoulder behind said pipeline piercing element for seating on the portion of said washer member defining the periphery of the opening,

an outlet passageway in said valve body communicating with said valve chamber,

and means for coupling said valve body to the pipeline.

2. The line tap valve of claim **1** further comprising a gasket on said pipeline-engaging face adapted to be received between said washer and the pipeline to provide a fluid seal.

3. The line tap valve of claim **1** wherein said valve shoulder has the shape of the frustum of a cone.

4. The line tap valve of claim **1** wherein said coupling means comprises a strap of high-tensile-strength material having first and second ends, said strap being disposed around the pipeline and connected to said valve body by the ends of said strap.

5. The line tap valve of claim **4** wherein said valve body is provided with a pair of slots in opposed side walls of said valve body, said slots being aligned in directions toward said pipeline-engaging face of said valve body, and the ends of said strap being bent back through an angle of greater than ninety degrees for mating engagement in said slots.

6. The line tap valve of claim **4** wherein the portion of said strap that is to be located opposite the partially drilled pilot hole is provided with an opening for accepting a screw member, a screw member passing through said opening and provided with an end for abutting the surface of the pipeline so that as said screw member is rotated said strap pulls the pipeline-engaging face of said valve body in intimate contact with the pipeline.

7. The line tap valve of claim **5** and wherein the portion of said strap that is to be located opposite the partially drilled pilot hole is provided with an opening for accepting a screw member, a screw member passing through said opening and provided with an end for abutting the surface of the pipeline so that as said screw member is rotated said strap pulls the pipeline-engaging face of said valve body in intimate contact with the pipeline.

8. The line tap valve of claim **7** further comprising a gasket on said pipeline-engaging face to provide a fluid seal.

9. The line tap valve of claim **8** wherein said valve shoulder has the shape of the frustum of a cone.

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U.S. Cl. X.R.

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